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ARTICLES

TOWARDS A MORAL PHILOSOPHY OF NATURAL DISASTER MITIGATION

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While there is often considerable discussion about the effectiveness, political feasibility, legality, and other aspects of natural disaster mitigation, moral and ethical dimensions are usually overlooked. This paper argues that the disaster planning community should begin to explicitly consider the moral foundations of public natural disaster mitigation policy. At the most basic level the key question arises: what is the extent of government's moral obligation to protect people and property from natural disasters such as hurricanes and earthquakes? While no definitive theory or position is put forth here, the author identifies several possible bases or elements of such a moral theory of mitigation. Among the moral criteria considered are: utilitarian and market failure rationales; the concept of basic rights; culpability and prevention of harm standards; and paternalism. Other non-disaster moral obligations, some conflicting and some complementary, are also identified and discussed.

NATURAL DISASTER MITIGATION AS A MORAL ISSUE

The U.S. and other countries around the world are subject to numerous, potentially-devastating natural disasters. These range from earthquakes to landslides to flash flooding (National Research Council 1987). They pose tremendous threats to life and property and as populations continue to grow and expand into hazardous areas (e.g., along America's coastline), these threats become increasingly serious (Petak and Atkisson 1982; White 1976). While the field of disaster planning has made substantial strides in recent years in increasing information about hazards, and in identifying and implementing numerous measures to ad-

dress them, the appropriate role of government in the disaster mitigation area remains uncertain. It is argued here that while considerable time has been devoted to considering the technical, political, economic, and other important aspects of disaster management, ethical and moral dimensions have been neglected. We have not adequately dealt with the moral questions of right and wrong, good and bad.

Virtually every aspect of natural disaster management involves difficult moral questions. We often speak of disaster management as involving four stages -- pre-disaster mitigation, preparedness, response, and recovery/reconstruction. For a full discussion of the planning activities at each stage see Foster 1980. At each stage emerge difficult ethical quandaries. During preparedness, for instance, public officials are confronted with the dilemma of when to call for evacuation. During response, public officials are confronted with difficult questions of how limited resources and personnel should be expended; e.g., how much time to be devoted to search and rescue, how much time and resources to be devoted to restoration of "life line" facilities, and which geographical areas should receive priority?. These dilemmas are numerous and largely beyond the scope of this article.

This article specifically addresses the moral and ethical aspects of natural disaster *mitigation*. The key question here is what are the moral obligations of society (i.e., government) to mitigate natural disasters. The appropriate role of government in mitigating such disasters, and for protecting the public from them, is certainly not settled -- indeed, there are numerous points of contention. This article seeks to accomplish two primary objectives. First, it seeks to illustrate and highlight the moral and ethical dimensions of natural disaster policy. Second, it attempts to identify the possible theoretical bases for a moral theory of natural disaster mitigation--both to justify and guide public policy in this area. The intent here is not to develop and argue for a specific moral theory or principle, but rather to identify some possible components or elements of such a theory. This I hope will contribute to further professional dialogue and perhaps subsequent consensus on at least the parameters of such a moral theory.

It should be noted initially that I conceive of mitigation quite broadly to include those actions or policies designed to prevent or reduce the impact of natural disasters. Specific examples of public mitigation range

from structural investments (e.g., building dikes and levees) to building and construction standards (e.g., elevation of buildings) to land use and growth management (e.g., keeping people and property out of the hazard zone). Also included are decisions and investments of the public to create warning and preparedness systems -- these too are long term mitigation strategies. For a more extensive discussion of the variety of mitigation strategies available, see Rossi et al. 1982; Godschalk and Brower 1985.

It is important to note that mitigation is typically intended both to protect property and to protect human life, and this holds implications for the ethics of disaster mitigation. It would be argued, by many, especially individuals in emergency response and rescue activities, that policies intended to prevent loss of life are on a higher moral plane than are mitigation policies which are simply intended to prevent or reduce the destruction of property. Often, of course, it is difficult in a practical sense to adopt public policies based on a sharp distinction between property loss and loss of human life. For instance, coastal building codes are often justified on property protection grounds yet experience shows that during hurricanes and coastal storms significant numbers of people are likely to reside in such buildings rather than evacuate (Beatley and Brower 1986). Building codes in this case, then, serve to protect human life. Nonetheless, the distinction between obligations to protect people, and obligations to protect property may be of considerable importance and should be kept in mind. The alternative moral principles described below treat this distinction in different ways and differences are highlighted where relevant.

The appropriateness of particular public policy responses to natural disasters will depend upon the specific ethical criteria or principles or standards one feels society ought to acknowledge and embrace. Moral philosophy offers several primary alternative ethical vantage points to guide planners and policymakers in the mitigation of natural disasters. I will identify and describe several below, as well as attempt to illustrate their practical policy implications.

UTILITARIAN PERSPECTIVES

Disaster mitigation can be justified and defended based on utilitarian ethics -- that is, that the policy or program seeks to maximize net social benefits. Founded on the writings of Bentham and J.S. Mill, the utilitarian perspective views the need for public disaster mitigation where benefits obtained from a mitigation project or action exceed the costs (Smart and Williams 1973). Furthermore, when choosing between public mitigation policies, planners and policymakers should choose those policies and projects which produce the greatest overall level of social benefits. The utilitarian perspective has been heavily institutionalized through the use of benefit-cost analysis, sometimes explicitly required by law. Whether policymakers choose to admit it or not, the utilitarian logic drives many decisions concerning mitigation.

A variant of utilitarianism is seen in arguments based on "market failure" -- that is, arguments that public mitigation policies and projects are needed because of certain basic imperfections in the market system. The free market is in turn a preferable way of making decisions because it permits individuals to express and satisfy their personal preferences and by doing so permits maximization of social welfare. Indeed, much of the contemporary work in advancing the methodology of cost-benefit analysis involves sophisticated attempts to estimate and predict how the free market would have behaved had market imperfections not existed. Increasingly economists have focused on contingent valuation studies to simulate market dynamics (Sagoff 1988).

A type of market failure worth expanding upon is the view that disaster mitigation is what economists call a "public good." Public goods refer to services and activities which are nonexclusive (difficult or impossible to exclude those who don't pay for it from its benefits) and nonrivalrous (one person's use does not diminish the utility gained for other individuals) (Moore 1978). Public goods will always be undersupplied because there exists a natural tendency for individuals to "free-ride" -- that is, individuals will not be willing to purchase the good or service if they know they will benefit from it irrespective of this contribution. A good example of this argument is found in the areas of hurricane warning and evacuation. Government is justified in intervening to provide this public good because if left to the private market such benefits would

be undersupplied. The provision of an extensive warning and evacuation system would provide benefits to the community-at-large, regardless of who has paid for them.

The concept of the *tragedy of the commons* becomes helpful here as well (Hardin 1962). Evacuation capacity is directly analogous, it can be argued, to the tragedy of the commons phenomenon. For instance, some developers and landowners might be willing to restrict the number of housing units they build (e.g., on a barrier island) to protect evacuation capacity. Yet, if other builders do not follow similar curtailments, then their actions will have no overall effect on evacuation and will only serve to harm their own economic position. Similarly, at a local jurisdictional level, one locality may be willing to regulate the density of development within its boundaries to keep evacuation times within acceptable limits, yet if other localities within the same evacuation-shed will not take similar actions, their restrictions will have no impact. This is illustrated in Table 1. Indeed, what their unilateral actions will accomplish, perhaps, is an outcome where they feel their community has been harmed economically because it will not receive its fair share of the regional growth pie (which may, of course, be quite positive for lots of other reasons).

The need to overcome what has been called the "assurance problem" often suggests the importance of larger institutional and governmental bodies which can bind individuals and social units to common agreements (e.g., see Runge 1984; Beatley 1984). A regional agency, for instance, may be necessary to negotiate and enforce agreements on local development restrictions. The efforts of states such as North Carolina and Florida to impose a common set of planning and development standards for coastal localities in the area of hurricane hazard mitigation falls into this category (e.g., see Godschalk et al. Forthcoming).

While there is considerable intuitive appeal to a moral view of mitigation which seeks to maximize benefits (it appeals, I think, to our sense of efficiency and to our sense that the broader public ought to benefit from public policies rather than just a few, select elements of society), there are some basic and fundamental limitations to such a foundation (e.g., Kelman 1985; Tribe 1972). One troubling category of problems is methodological. There are tremendously complex questions

concerning how social costs and benefits ought actually to be tabulated and accounted for. How, for instance, are we to really know what it would be worth to individuals to have a lower evacuation time? Many of these methodological issues themselves involve substantial value questions. In weighing the costs and benefits of a mitigation policy -- whether to retrofit a hospital to protect it from future earthquakes, for instance -- it may be necessary for us to factor in the value of lives lost should the hospital structure fail during an earthquake. While there have been methodological techniques developed to estimate such values (e.g., by estimating potential earning power), many would object to the very idea of placing a monetary value on human life. Once this is done, it places us in a rather uncomfortable position when using this information. Under the utilitarian model, it may be a relevant factor whether the hospital is primarily serving younger clients versus serving an older clientele. Retrofitting would be less justifiable in the latter case because the potential earning power (social contributions) of the elderly would be considerably lower than the future contributions of the young. An earthquake which killed a number of elderly might even be doing society a favor, from the utilitarian's perspective, by reducing the drain on health care and other social resources caused by such individuals. This type of thinking would clearly be repulsive to many.

Table 1
HYPOTHETICAL EVACUATION TIMES AS A FUNCTION OF GROWTH RESTRICTIONS

		Community B	
		Growth Restrictions	No Restrictions
Community A	Growth Restrictions	12 Hours	36 Hours
	No Restrictions	36 Hours	40 Hours

An untempered utilitarianism, moreover, may lead to many results which strike us as simply unjust or unethical. The market failure model, for instance, assumes that the benefits and costs of a public intervention are to be estimated based on the willingness and ability-to-pay of individuals. If individuals would not be able to pay to mitigate natural disasters -- to prevent exposure to volcanic hazards or coastal flooding, for instance -- then there could surely be no market failure by which to justify public intervention to protect these individuals. It is clear that many of the most devastating natural disasters in recent history have had their greatest impact on relatively poor populations -- individuals who would tend to be least capable of paying for such mitigation. Could it be argued, for instance, that market failure occurred in Bangladesh, devastated by recent flooding and where the average individual is very poor? Even in developed countries research strongly suggests that natural disasters have their greatest impact on the poorest populations (e.g., see Geipel 1982; Cochrane 1975).

The most vehement opponents of the utilitarian paradigm criticize it on the grounds that it sacrifices the interests of individuals to the broader social good (e.g., see Rawls 1971). It may deem as completely acceptable, for instance, for a public agency to adopt a disaster policy which allows the frequent exposure of individuals to life threatening disasters where the economic and other benefits exceed the disbenefits. It may be entirely justifiable, for example, to expose an entire town to a mudslide threat, where the productive output of that town and its particular location is substantial (say, because of the mining or other extractive industry located there). Relocating the town to another site would, in this case, find little or no support from utilitarians and indeed might, quite to the contrary, induce social inefficiency. Thus, while utilitarianism may be intuitively attractive on one level, it may lead to morally unacceptable outcomes. This suggests the need to search for other moral bases to replace or at least supplement the utilitarian model.

Some have been critical of the utilitarian approach because it confuses people's consumer preferences and demands with their social values. Public policy is not simply the collecting and adding up of consumer preferences, but rather is appropriately the outcome of a deliberative debate and dialogue (Sagoff 1981; 1988). As an example, the utilitarian or benefit-cost proponent might conclude that public policy should permit evacuation times to skyrocket because preferences to move into a hazard zone remain high. Yet, a public policy dialogue, in which individuals are asked to consider and establish an acceptable collective evacuation rate, would likely lead to a different conclusion. The

simple addition of individual consumer preferences seems a largely inappropriate basis for public disaster mitigation policy.

A RIGHT TO NATURAL DISASTER MITIGATION?

Some moral philosophers have sought to place restrictions on the workings of utilitarians by arguing that individuals have certain basic **rights** that cannot be superceded or disregarded simply because the policy or outcome would lead to maximal social benefits. Such rights can stem from many different sources, including state and federal constitutions, moral proclamations and some rights are said to be **natural** rights -- that is inherent in everyone by virtue of his or her humanness. To say that someone has a right implies that they have a right to something, and that there exists a corresponding **obligation**, presumably by society, to provide it.

At the broadcast level, Shue (1980) argues that every individual has certain **basic** rights -- specifically rights to physical security and subsistence. Without these basic rights it will be impossible to enjoy any other rights. More specifically Shue (1980, p. 23) defines subsistence, or "minimum economic security" to mean "unpolluted air, unpolluted water, and adequate food, adequate clothing, adequate shelter, and minimum preventive public health care." The United Nations Universal Declaration of Human Rights establishes a similar listing of basic human rights.

This is appealing and acceptable at a general level, yet the problems arise when we begin to ask what more precisely such rights entail. To be sure, even if all societal resources were expended to protect individuals from natural catastrophes some level of risk would still remain. The question becomes what a right to **mitigation** actually demands. At least a partial step in the right direction might be to argue that individuals have a right to (at least) be protected from **unreasonably great** threats to their lives. While this is perhaps some improvement, we remain wondering what level of risk is unreasonable. The idea here is that all individuals have the right to some basic minimum level of public safety -- a level which cannot be compromised even where the social benefits would exceed the costs. It is not morally acceptable to allow, or indeed to expect, a significant loss of life from a natural disaster, without taking

public actions to prevent or minimize it, simply because such an outcome would, in the long run, be socially efficient.

Such a minimum right to personal safety is difficult to articulate in absolute terms. Rather, it may need to be debated and expressed on a hazard-by-hazard, case-by-case basis. We may conclude, for instance, that each individual has a basic right to ease of evacuation and perhaps more specifically has the right to be free from evacuation times which exceed, say, twenty-four hours. In coastal areas it might be argued that any individual ought to have the right to live in a house or structure which meets certain basic design standards, and more specifically, will withstand, say, sustained winds of 100 mph at a minimum.

One wonders also whether such standards which define a minimum basic right are, or should be, different depending upon the cultural, economic and political setting. What might be considered the minimum level of protection people are entitled to by right in Bangladesh might be substantially different (presumably lower) than in Mexico, for instance, which may in turn be substantially different than that acknowledged in the U.S. However, to speak in terms of relative rights seem fundamentally in contrast with the concept of basic rights. If a basic human right to protection from natural disasters exists one place, it should surely exist everywhere.

While many would support the concept of basic right to personal protection from disasters, it is not clear whether such a right would extend to the protection of property. Again, most would place property protection on a somewhat lower moral plane. Yet, it could be argued that where property is so basic and so intimately tied to an individual's subsistence and well being, (e.g., and would likely not apply to wealthy persons' vacation homes) government also has a strong moral obligation to protect it and to assist in its replacement where destroyed.

The broader question arises of how natural disasters -- and freedom from natural disasters -- fit into society's larger distribution of wealth. The ethical theory of John Rawls, for instance, as enumerated in *A Theory of Justice*, provides perhaps the strongest direct repudiation of utilitarianism, and offers some insight here. Rawls (1971) speculates about what basic principles of justice would be chosen by individuals in the hypothetical "original position," cloaked under a "veil of ignorance" concerning their own particular circumstances and resources in life.

From this he derives his famous two principles of justice. Under the first principle, individuals are to be ensured an equal set of the same basic liberties (free speech, political assembly, etc.).[1] Under the second principle, known as the "Difference Principle," social and economic inequalities are to be tolerated only when they lead to the maximal benefit of the least-advantaged (measured in terms of what Rawls calls "primary goods," or things that everyone is assumed to want regardless of one's particular life plan; see Beatley 1984). This adds further support for acknowledging an ethical obligation to protect the welfare of individuals subjected to threats of natural disasters, and exhorts us to consider the particular plight of those who are on the lower end of the economic and social continuum. For these individuals there will be fewer personal resources to protect themselves against natural disasters. One might suggest from Rawls' theory that inequalities in resources -- which lead to inequalities in protection from natural disasters -- would not be in the maximal interests of the least-advantaged. It would argue for governmental mitigation programs and policies to ensure that the least-advantaged are not unfairly burdened with high levels of exposure to natural disasters.

Of course, it could be argued that this interpretation of Rawls may justify public policies which allow people to be placed at great risk to natural disasters. It could be argued, particularly in less developed countries, that the least-advantaged groups are on **balance** better off then they would be if social and economic inequalities were not tolerated.[2] If inequalities in hazard levels were eliminated, employment levels, wages, and other counter-balancing benefits would be lowered as well. Nonetheless, it seems reasonable that, prima facie, society has an ethical obligation to ensure certain minimum levels of protection from natural disasters. Particular attention and deference must be afforded to these social groups.

An additional moral question of relevance here is whether nations have obligations to assist in disaster mitigation and recovery **beyond their borders**. Does the notion of a minimum right to protection from natural disasters suggest that one nation has an obligation to provide assistance (financial or otherwise) to another, where this mitigation right is in jeopardy? Provision of international aid in time of disaster is a widely accepted practice, although it is not at all clear that the amount of this

assistance is ever commensurate with the need. Provision of disaster assistance also becomes intertwined with political and ideological matters as the recent refusal of the U.S. to provide disaster assistance to Nicaragua following Hurricane Joan illustrates. Although some ethicists have argued the need to take international positions based upon a kind of "lifeboat ethics" (and the belief that the only way countries will adequately plan for disasters is if they must bear their full costs; e.g., see Hardin 1977). There appears considerable moral weight to arguments that certain mitigation duties do extend beyond one's own jurisdictional boundaries (e.g., see Hoffmann 1981; Beitz 1979). The actual extent of such international obligations is disputable, but would appear to be greater the more affluent the nation.

CULPABILITY AND PREVENTION OF HARM

Public disaster mitigation policy may find its foundation in other principles as well. John Stuart Mill in his classic treatise, *On Liberty* (1859), argues that government has the right to restrict the liberties of individuals when these liberties conflict with the liberties and rights of others and the broader public. For instance, we restrict the liberty of automobile owners to drive at high speeds through residential neighborhoods because such a freedom would violate the rights of neighborhood residents. Exercising the automobile owner's liberty in this case has "external" effects on others.[3] This presents an additional ethical basis upon which natural disaster mitigation efforts can be founded. Society has the right, it is frequently argued, to regulate hazardous development patterns because they have deleterious or negative external effects on other individuals and society as a whole. What is expressed here is a principle of preventing harm.

Much contemporary public disaster mitigation policy can be justified based on the belief that it is fundamentally inequitable for one party or parties to inflict the risk of damages and loss of life onto others and the public-at-large. Such a policy might justify public restrictions, for instance, on the use of private shore-hardening structures -- such as bulkheads and jetties. While such structures may solve one person's problems, they typically exacerbate the natural forces that others are exposed to (e.g., see Pilkey et al. 1980).

At a more macro level, the principle of preventing harm may be used to justify protecting the larger community from the devastation of a natural disaster. It could be argued, for example, that allowing commercial structures to locate in high hazard areas where they could be destroyed in the event of an earthquake or hurricane has external, community-wide impacts that extend beyond the risks to these business establishments. Devastation of the economic base in the event of a natural disaster will put many people out of work, will have secondary economic impacts (economic ripple effects), and because of the destruction of the community's tax base may substantially interfere with the provision of necessary community services. These, it could be argued, are serious harms created by such development patterns, and as such support government actions to prevent these harms (e.g., by requiring commercial structures to locate in safer areas, or by imposing special building and design standards which reduce the probability that such community harms will result). This reasoning may also provide a strong rationale for preventing the reconstruction of businesses and other structures in the same hazardous locations following a disaster (although the political and economic forces present will make such restrictions difficult to implement; see Haas et al. 1977).

Substantial research in the United States suggests that there are few long term economic effects from natural disasters (e.g., Friesema et al. 1979; Wright et al. 1979). Such findings may reduce the strength of this particular ethical argument if it can be shown that a community will be no worse-off economically following a disaster (and some may even be better off). These types of post-disaster economic impacts, however, are likely to be substantially greater and longer-lasting in less-affluent and less-developed countries (and where governmental disaster assistance is not as extensive and recovery institutions not as developed).

We may also employ the **principle of culpability** to establish policies which impose the responsibilities and costs of mitigation onto those individuals and groups creating the disaster or harm in the first place. For instance, such a principle might justify a policy of requiring a developer to undertake a mitigation project -- perhaps some form of flood control -- because his or her project will increase tremendously the flooding problem downriver (e.g., by building in the floodplain). Public disaster mitigation policy might, on the other hand, prevent the floodplain

project entirely, thereby preventing the downriver flooding. Note that the construction of the development project (and allowing the additional flooding downriver) may be the socially efficient or utilitarian outcome. The central idea here is that despite this fact, the result of permitting one party to impose substantial disaster costs on another party may simply be unfair. In this sense, disaster mitigation policy finds its justification in a way similar to air and water pollution regulations. We are indignant when we learn that a factory has emitted toxic water pollutants because we think it unfair that the public should have to bear these costs. Moreover, if the project is permitted, culpability will argue that those who are causing these externalities should be required to pay for their mitigation, or at least the lion's share of these costs. The fact that these externalities are often imposed as a result of land developments which generate substantial profits may add an additional perspective from fairness. In these circumstances, it can be argued that land development is a private privilege socially conferred and approved and consequently that such development must satisfy whatever community standards concerning risks are in place.[4]

The culpability standard could, as well, find application in federal-state-local mitigation policy. The recent history of U.S. disaster policy indicates that the federal government has heavily subsidized rebuilding and redevelopment (e.g., Clary 1985; Settle 1985; Dacy and Kunreuther 1969). It might be argued, for instance, that while federal disaster assistance is certainly sometimes justified, often the fair outcome would be to leave much of the cost associated with rebuilding and recovering from disasters to the actual localities incurring the damages. This is so, it can further be argued, because it is largely a result of their permitting hazardous development patterns in the first place. If a locality chooses, for instance, to permit -- indeed encourage -- construction in high-hazard coastal areas, it should be prepared to bear the costs when disaster strikes. I am reminded of the case of the barrier island off the Alabama coast which has been repeatedly damaged from storms and coastal flooding -- the costs of which have been largely absorbed over the years by the federal government. State and local officials were somewhat indignant when a recent federal interagency hazard mitigation team suggested that the island and its residents begin setting funds aside to pay for the future flooding costs that would surely result (e.g., see FEMA

1985). Culpability suggests that this would be an equitable result. Recent federal initiatives to reduce the extent of federal subsidy in high-risk coastal areas, through the Coastal Barriers Resources Act, are partly a response to this principle (see Kuehn 1984).

Culpability and prevention of harm principles also have application in international contexts. Not infrequently do the actions of one nation serve to create or seriously exacerbate the potential for natural disaster in other countries. The recent Bangladesh floods are perhaps illustrative of these inter-jurisdictional impacts. In this particular case the flooding problem has been substantially aggravated as a result of extensive upland logging and deforestation in India and Nepal. The prevention of harm standard would seem to strongly obligate these nations to take whatever actions necessary to prevent such deforestation and to restore levels of run-off and river flow more commensurate with "natural" rates. Culpability may also suggest that these countries be asked or required to contribute to the costs of needed flood control projects or post-disaster assistance.

PATERNALISM AND PERSONAL RISK-TAKING

As noted earlier, Mill and others conceive as legitimate only government interferences with free choice where the actions of these individuals harm others or the broader public. I wish to expand the elements of a moral philosophy of disaster mitigation by considering public intervention to mitigate natural disasters even in situations where such actions may be contrary to immediate individual preferences. These types of interventions have often been described under the heading of "paternalism" (see Beatley 1985). Gerald Dworkin (1971, p. 108) defines paternalism as the "interference with a person's liberty of action justified by reasons referring exclusively to the welfare, good, happiness, needs, interests or values of the person being coerced."

Consider an example from coastal hurricane hazards. A local development project is proposed for a barrier island -- an island which has been essentially undeveloped and which the only way to evacuate is by ferry (a slow and time-consuming process).[5] Because of the size of the proposed development, and the number of people that would have to evacuate in the event of a hurricane, the time required to get these

future residents off the island through the use of ferries would be very great. In reviewing this proposed project, the County Board of Commissioners decides that they are not willing to approve the project unless the development company agrees to make a number of mitigation expenditures, including the construction of a bridge to the mainland. The developers argue, however, that such requirements will raise the price of housing and that such actions are essentially paternalistic -- e.g., individual home buyers should be permitted to decide for themselves whether the proposed development is too risky for them (presumably they will buy homes elsewhere if they decide it is).[6]

On what basis can a moral philosophy defend such public interventions? A primary justification might be found in the fact that full and adequate information concerning the nature of natural hazards is often missing. Individuals, particularly those who have never lived on the coast before, often tend to misunderstand and underestimate coastal hurricane and storm hazards. (e.g., see Ruch and Christensen 1981). These hazards may be downplayed by real estate representatives, and the existence of such hazards may not even be mentioned in the real estate transaction. Moreover, the very existence of a large, planned development may tend to create a sense of security for the potential residents. This sense of security would be further heightened by official approval of the project by local and other governmental authorities (e.g., "it must be safe, otherwise they wouldn't permit it").[7]

Lack of information about natural disasters may suggest the need for additional public education or mandatory hazard disclosure provisions such as those in use in California (Palm 1981). Even where adequate information is available, however, there is considerable evidence to suggest that individuals will continue to make irrational decisions (see Tversky and Kahneman 1974; Slovic et al. 1974; Weinstein 1980; Kunreuther 1978). Among other things, there is an experiential component to disaster risk assessment. While individuals may understand the objective facts about the risks, they may not fully grasp the implications of these risks (e.g., the real terror of riding out a hurricane). Cultural factors may also play a role, in that individuals may place too much faith in fate or religion, believing control of natural disasters and other life events are beyond their control (Sims and Baumann 1972).

Thus, public disaster mitigation policies justified based on these informational and decision-making imperfections, find their theoretical support in a similar fashion as much as consumer protection and public health regulation.[8] We may prevent an individual from exercising his freedom of choice because he lacks the necessary understanding to make an informed decision. Thus, we do not allow someone to place oneself at risk just as we do not rely on individual consumers to detect a dangerous ingredient in an over-the-counter product -- rather, we ban or heavily restrict the use of this ingredient. We may conclude, then, as Kelman (1981) does, that such restrictions are not paternalistic in the strict sense. As a recent Florida publication suggests, building codes and construction standards which incorporate minimum wind resistance are necessary because individual housing consumers are unlikely to be knowledgeable enough to know the difference between a safe and an unsafe structure:

> The specification of a safety standard is always controversial. On the other hand, we argue that human life is precious while our actions indicate that people treat their own lives as if they were not (e.g., someone driving after drinking). It is this aspect of protecting an individual from himself that is an issue. Should an informed individual elect to remain in an unsafe structure during a hurricane, is this not his own choice? While this may be debatable, it does not really deal with the issue. Allowing one group to elect a high risk will invoke the assumption of that risk by subsequent owners/occupants. Whether they are knowledgeable about the risks may be a different matter. Perhaps a disclosure requirement might be adequate protection, however, it still leaves open the question as to why a less than adequate structure was allowed in the first place (Florida Department of Natural Resources 1982, p. 19).

Goodin (1976) has argued for something he calls "retrospective rationality," defending unpopular government polices in situations where the future perceptions and preferences of the public are likely to change. J.S. Mill presents the classic example of the man about to walk across a bridge that no longer exists, but is restrained just in time by a

friend. The friend's interference with the walker's liberty in this case is justified because in retrospect the walker would thank his friend. A similar rationale could be applied to the barrier island case. The public, in this case the locality, is justified in imposing these additional mitigation requirements because the residents of the island will be thankful later, and indeed vindicate these requirements, during the next hurricane or severe coastal storm.

At perhaps a more fundamental level, such a moral philosophy finds its support in the inherent responsibility the collective has to protect the interests and well being of its constituents. There are several elements to this position. One is the fact that individuals, generally, are limited in the extent to which they are able to protect themselves. It is simply a fact of human existence that there are too many complex demands on the limited time and mental attention span of human beings. Second, in a representative-democracy, public officials are elected and governmental programs are created to assume -- with the implicit, if not explicit consent of constituents -- such risk analysis and risk-reduction functions. George Will (1985) talks of what he calls the "Take-for-Granted Quotient: or the TFGQ. He argues that as the complexity of life increases over time it is government's responsibility to balance and resolve in advance many of the questions of risk and uncertainty which exist:

> We must take much on trust. If we took time to understand everything, we would never get the lawn mower sharpened or the screen door repaired.
>
> A flourishing economy, indeed a functioning society, depends on the mass of men and women not thinking about a large and growing number of things they depend on in daily life. One measure of the modernity of the modern world is the TFGQ - The take-for-granted quotient. A crucial task - crucial, although often mundane - of modern government is to enlarge the TFGQ.
>
> It does this by inspecting restaurants, so customers need not calculate the risk before deciding to trust an unfamiliar kitchen. It certifies the safety of elevators so we never need to make a

prudential calculation before inserting ourselves in a box hauled aloft by (I am guessing) pulleys and cables and things.

Of course, government, as is its wont, often gets carried away and tries to reduce to zero life's risks. Nevertheless, to keep modern society flowing, government must act in many small ways to take large amounts of hesitancy out of life. It does this, for example, when it provides insurance for deposits in thrift institutions. Such insurance removes the drag of anxiety form a crucial social activity - saving.

Government's efforts to place parameters on individual free choice represent a particularly difficult ethical dilemma. Yet, even Mill places restrictions on the extent to which individuals exercise liberties which affect only them. No individual has the liberty, for instance, to sell him or herself into slavery. In the U.S. and elsewhere suicide is illegal. The extent to which the collective has the authority to evaluate the personal risk tradeoffs individuals confront daily is an interesting ethical question. Table 2, for instance, presents a hypothetical tradeoff matrix for an individual considering different wage levels that might correspond to different levels of occupational risk. In this particular case, let us assume that if the government had not stepped in to regulate the exposure of workers (reducing the risk to 70 deaths per million), this individual would have been able to earn an additional $2.00 per hour in wages. Is this an additional level of risk we should have permitted the individual to take if she or he wished to? Of course, intervention might be justified based on many of the ethical positions examined earlier in this article. It may be argued that individuals have a basic right to be free from exposure to chemical risks any greater than 70 deaths per million people exposed. Yet, what if the individual voluntarily assumes the additional level of risk, foregoing this basic right, with a full understanding of the nature and magnitude of the risk? These are difficult ethical questions.

Table 3 presents the same sort of tradeoff matrix for the barrier island case. Let's assume that without the additional mitigation improvements the cost of an individual's home in this hypothetical example would be somewhat lower (e.g., the additional bridge to the mainland would not have to be built). Should the government in this case interfere with the right of the individual to accept a higher level of human risk for a lower-priced home? While these are admittedly simplistic depictions of what would in fact be complex risk analyses, these cases do hopefully illustrate the type of individual risk tradeoffs society is confronted with and which it must sometimes place parameters around.

Table 2
ENVIRONMENTAL RISK/EMPLOYMENT WAGE TRADEOFF MATRIX FOR A HYPOTHETICAL INDIVIDUAL

Risk of Death From Chemical Exposure	Hourly Wage
70 individuals per million	$5.00
140 individuals per million	$7.00

Table 3
HURRICAN RISK/HOUSING COST TRADEOFF MATRIX FOR A HYPOTHETICAL INDIVIDUAL

	Evacuation Time Off Island	Housing Cost
Without Mitigation Improvments	48 Hours	$70,000
With Mitigation Improvements	8 Hours	$80,000

Such restrictions on individual liberty are acceptable only in the context of other important considerations. One consideration is the extent to which the government's intervention constitutes a fundamental obstruction of individual freedom. To what extent, for instance, will the barrier island mitigation requirements fundamentally impede the ability of an individual to fulfill his or her life plans. They will not, I would argue. Thus, the extent and nature of the government's intervention must be carefully considered. If, for instance, the government prohibited individuals from living on the coast at all, the form of intervention would be considerably more obtrusive and indefensible. Second, disaster mitigation interventions must occur in the context of an open democratic community. Affected individuals must be given the opportunity to voice their reactions to, and indeed take political actions (e.g., voting the rascals out of office) based upon such intervention. The ethical legitimacy

of such public interferences is more questionable in countries where these democratic conditions do not exist.

ACKNOWLEDGING OTHER OBLIGATIONS

Thus far, I have dealt entirely with moral obligations relating directly to the reduction or elimination of natural disasters. There may exist, as well, other moral obligations which society, and its government agencies, should acknowledge and respect which have the effect of lessening natural disasters. Do we have obligations, for instance, to protect the integrity of natural systems, irrespective of the obligation to reduce natural disasters? Do we have obligations to prevent the filling of wetlands or the destruction of beaches and dunes for non-disaster reasons, for instance because these are deemed to be "public trust" resources, to be maintained and enjoyed by the public in perpetuity (e.g., see Sax 1971)? Do we have an obligation to maintain the natural flow of rivers and to prevent development in river corridors not because of the risk to man but rather because such activities would jeopardize the continued existence of endangered species (e.g., Ehrlich and Ehrlich 1981; Norton 1986)? Do we have obligations to future generations to protect sensitive environmental areas for their beauty and spirituality (e.g., see Partridge 1981; Sikora and Barry 1978)? The topic of environmental ethics, generally, is an expansive and growing one and clearly beyond the scope of this article. Obligations from environmental ethics may go far in justifying and defending public policies which in the end mitigate natural disasters (for a general review of environmental ethics, see Van DeVeer and Pierce 1986; Rolston 1988; Regan 1984).

Of course, moral obligations from environmental ethics are not necessarily complementary to obligations to protect people and property from natural disasters. For instance, it may be deemed necessary to construct a dam to ensure a minimum level of protection to a downstream town from catastrophic flooding. Construction of dams and other flood control projects are notorious for their damaging effects on the environment. Construction of such a dam may jeopardize the existence of one or more endangered species (such as in the now famous Tellico Dam/Snail Darter case), an outcome which would appear clearly inconsistent with principles from environmental ethics. Of course, in

many developing countries any possible acknowledgement of such environmental ethics is frequently outweighed by short-turn economic concerns (e.g., providing basic subsistence; see Kellert 1986). Nonetheless, this does raise a key point that public disaster mitigation issues are morally complex, often involving competing moral demands (from environmental ethics and elsewhere) and public officials may be called upon to balance and prioritize these ethical obligations.

One particularly difficult conflicting demand arises from the institution of private property. Many public disaster mitigation measures, such as the exactions imposed in the hypothetical barrier island case, bump directly against the rights of landowners to use and economically profit from their property. Indeed, the 5th Amendment of the U.S. Constitution contains the so-called "takings clause" stating that government shall not take private property for public use without just compensation (for a history of takings clause see Bosselman et al. 1976). Government regulations, such as regulations of development in floodplains, have been found by the courts to be so extensive that they amount to such unconstitutional takings. Planners and government officials, then, are increasingly concerned about how far to extend their mitigation efforts before infringing upon the legitimate rights and expectations of property owners. The constitutional issue aside, there is the perceptual problem that many landowners believe their rights of use are absolute (which is clearly not the case). Thus, the private property issue figures prominently into the moral equation and should ideally be confronted in any debate concerning a moral theory of disaster mitigation. In countries where the institution of private property is not as entrenched, this conflicting ethical demand may be of less importance.

SOME CONCLUSIONS

We are often not used to speaking about disaster policies and programs in terms of whether or not they are morally or ethically correct. Rather, we are more often used to evaluating such policies in terms of whether they work (e.g., whether they are effective at reducing property loss and loss of life), how easily they can be administered, whether they are legally sound, and so on. We are not used to speaking about such policies as being **right** or **wrong**. This article has

initiate dialogue on the moral foundations of public disaster mitigation and has reviewed several key alternative ethical points of view.

I have not attempted to argue for or defend a particular principle or set of principles. Rather, I have sought primarily to identify the relevant moral terrain. Each principle or moral foundation discussed above can be seen to have some merit, and intuitive and logical appeal. Moreover, it is not clear that individuals or public agencies must adopt only one. Several options appear to exist here. One is to construct a hybrid -- that is to build a more acceptable theory by combining one or more of the principles or ethical viewpoints discussed. For instance, the utilitarian and rights-base approaches need not be completely irreconcilable. A sensible moral position might be that individuals have the right to a certain minimum level of protection from natural disasters, but that beyond that, a utilitarian maximizing of social welfare is appropriate. A second approach might be to selectively apply different ethical principles depending upon the particular disaster circumstances at hand -- viewing it as difficult to devise a single unitary theory that could be employed in all situations. When considering ethical obligations to mitigate flooding hazards along the coastline, for instance, the culpability standard may have clear and direct application. When considering obligations to mitigate inland landslide hazards, culpability may have little direct relevance, elevating the importance of other moral considerations.

This article has but skimmed the surface of this subject and suggests the need for considerably more research and thought on the ethical dimensions of disaster policy. Which principles or combinations of principles are indeed more ethically defensible, and in which situations? Do ethical arguments and perspectives developed in the U.S. context have universal application to other nations, or must culture-sensitive principles be considered? Furthermore, while this article has identified the broad theoretical underpinnings of a moral philosophy of disaster mitigation, considerable future work is necessary to flesh out in much greater detail the specifics of such concepts as culpability and prevention of harm.

While this is by no means a full and comprehensive discussion of the range of ethical viewpoints and positions, it at least identifies the broad contours of a moral theory of mitigation and initiates debate. Considerable research suggests the difficulty of elevating natural disaster

mitigation high on political agendas (e.g., Rossi et al. 1982; Drabek et al. 1983). This may in part be a function of the inability thus far of disaster management professionals and the field in general to put forth convincing and compelling moral arguments. The future challenge for disaster managers, then, is to formulate and defend such positions, both on local and global levels.

NOTES

1. It should be noted that Rawls' notion of basic liberties is quite different from Shue's (1980) and others. Rawls conceives of these as primarily freedoms from interference, e.g., interference with one's right to express herself, interference with one's political freedoms, freedom of movement, freedom to own property, etc. This differes from the notion of **positive** freedoms, that is, the freedom of access to food, shelter, other resources.
2. Rawls does not distinguish between specific primary goods, but appears instead to conceive of them as package, with the position of social groups gauged by the overall **level** of such goods. This suggests, at a minimum, that safety from natural disasters should be considered as a specific case fo a primary good, among many others. It suggests, as well, that safety from natural disasters could be traded away for more of some other primary good, with the overall package of goods increasing for an indvidual or social group. To many, this would be an unacceptable outcome.
3. The reader should note that I am using the terms freedom and liberty synonymously here.
4. It can be argued that developers have no grounds to complain about mitigation requirements (e.g., coastal setbacks) which reduce their profit levels because it is largely the public which has subsidized and created the necessary climate for such development. A case in point is private development on barrier islands, where bridges, causeways and other infrastructures necessary for private development have been provided by the public. See Hagman and Misczynski 1978.
5. This example is drawn from Beatley 1985. A more extensive discussion of this case is found there.

6. Actually, it could be argued that this may not be a good example because the obvious fact of the absence of a bridge to the mainland may do much to ensure that potential residents think about these risks. Perhaps a better example is a case (the more typical situation) where a bridge exists, but its capacity in relation to the island populations is woefully inadequate. Here, potential residents would receive the false impression that an adequate escape route did in fact exist.
7. This offical approval also raises questions of the liability of the agency or government issuing the permit. This question then has relevance to the earlier discussion about culpability. Are local governments culpable for disaster impacts where they have been party to the development process and where they had the opportunity to prevent the exposure of people and property to natural disasters? Some courts have taken this position. See Kusler 1985.
8. In this sense such a justification could be classified as a form of market failure. Recall that the market model generally assumes the availability of full and complete information when consumers are making decision.

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